WHEN TRUST MATTERS

Anchor handling operations
Rules & Standards – ongoing initiatives

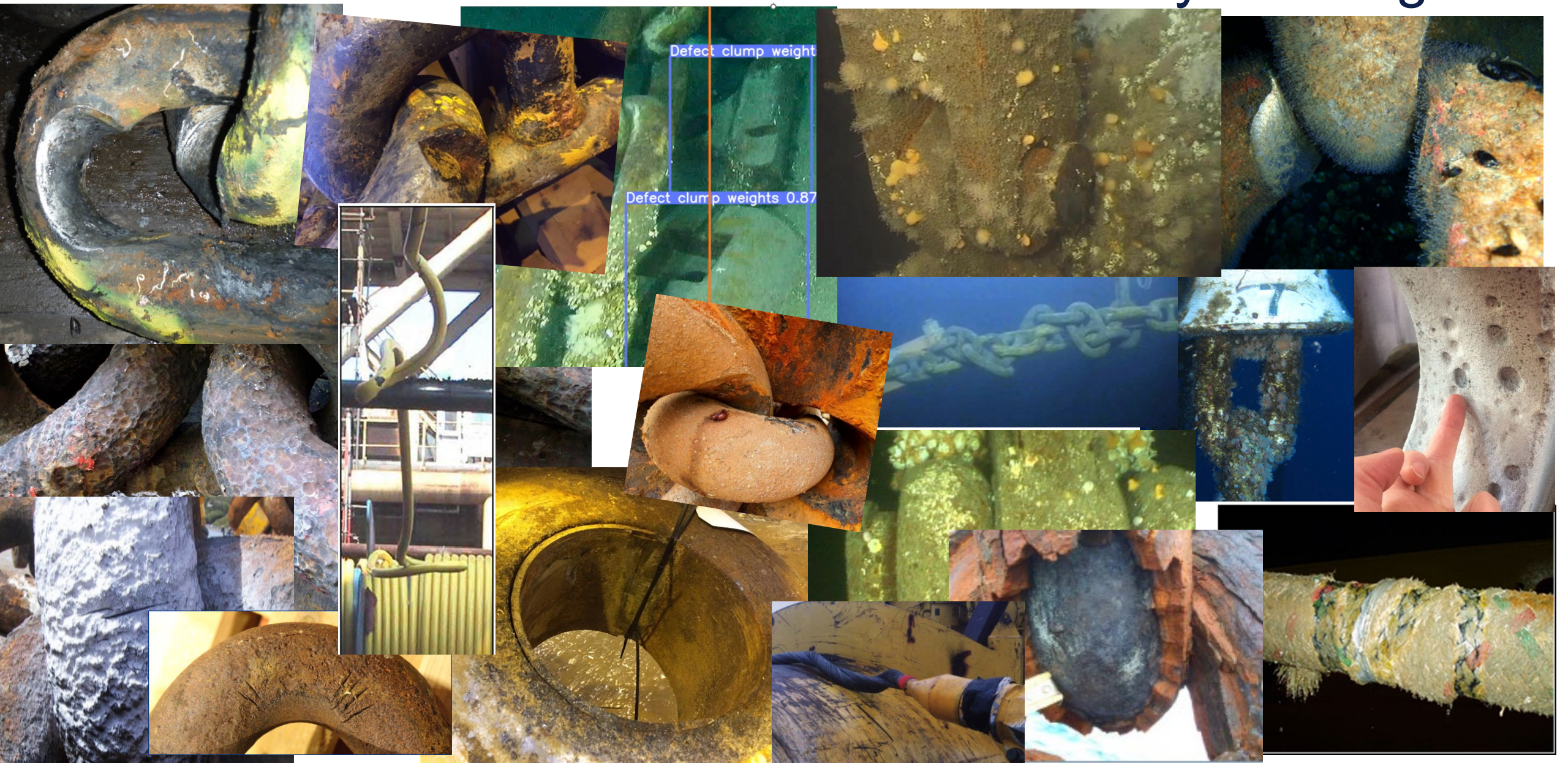
+ New SOLAS in-retro requirements to AH winches & equipment

Dag-Børre Lillestøl, DNV

«Marine Operasjoner i Praksis», Bergen, 24 April 2025

“What Got Us Here – Won’t Get Us There”

Rules and Standards – shall reflect industry learnings…



Current Class focus

- Revise AOSS (Approval Of Service Supplier) schemes
  - Refine requirements to logging of loads
  - Usage based survey schemes for all mooring components – streamline and focus – AOSS implementation
  - Implementation of audit regime
- API RP 2I calibration – RBI/MIM – mobile mooring
- Line dynamics & load logging -> natural part of operation planning & inspection basis
- Improved anchor recovery procedures
  - new “good industry practice” (ref. GOMO 2024 May Edition)
- New IMO Guidelines – SOLAS II-1/3-13 MSC.1 1662
  - RU-SHIP Part 5 Chapter 9
    - Update of requirements for anchor handling winches and associated equipment
    - New Class Notation T-Log)
    - Accommodate new SOLAS regulation II-1/3-13 / IMO MSC.1 1662 requirements
  - RU-SHIP Part 7 Chapter 3
    - In-service requirements for follow-up of anchor handling winches (as per SOLAS + Class Notations)

Future Class focus

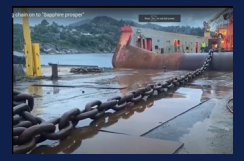
- New approach – weather based disconnect criteria
  - Reduced offset / increase operational window / reduce emissions / less assembly on deck, etc
  - Reduce pre-setting loads
  - Scheme will require approval of release system(s)
    - (Class focus changed from safety only towards unintended release to ensuring that it also releases when required)
    - Ongoing process to define operational range and reliable deployment methodology
- Upgrade options – existing anchor handling winches
  - improved load monitoring and data extraction (carrots – not stick – for now)
- Fatigue for mobile mooring chain
  - Data logging of anchor handling operations
  - Incentive/gains for combining all operations (installation & recovery + rig operation)
- Further investigate high strength chain material usage and application (JIP ongoing)
- Reduced/diversified anchor setting loads and holding time
  - Revised DNV-RP-E301
- Wear vs. line movement (JIP pitched)

DNV-RU-OU-0300 update

Updates in July 2022 Edition – entered into force 1st January 2023

DNV-RU-OU-0300:

- New requirements to handling:
  - Onshore handling



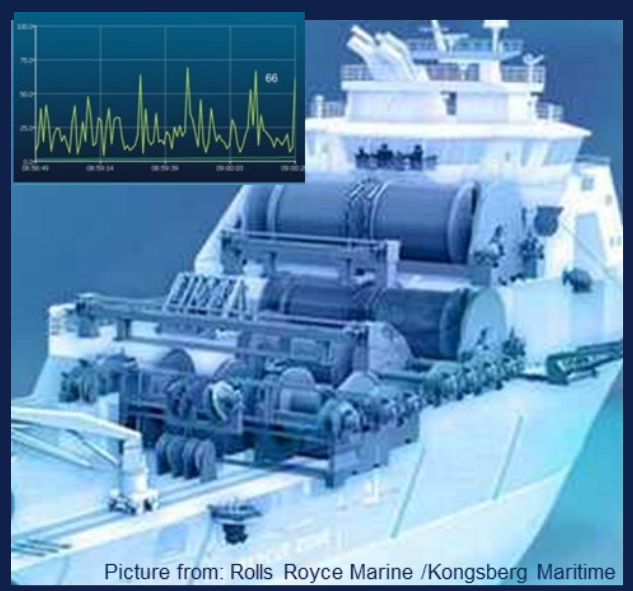
    - New general requirements
    - Specific add. requirements for high strength chains
    - Focus on loading/offloading of chain
    - Reduction in friction and high energy impact loads
  - Offshore handling:

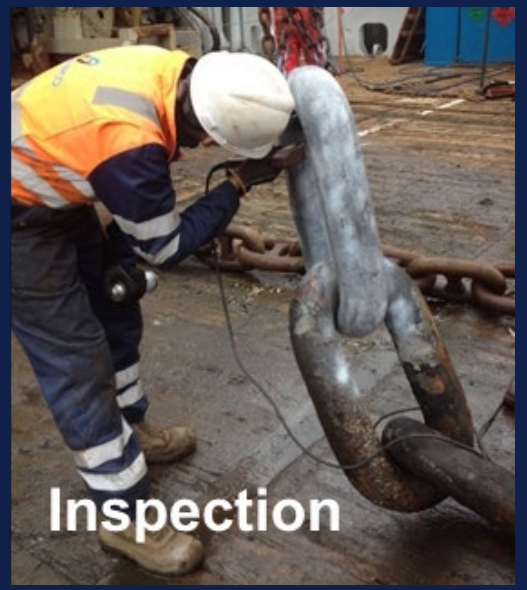
    - Installation/pre-tensioning
    - Recovery/”breakout”
    - Monitoring & logging of tension data
    - Reduction of impact & overloads
    - Specific requirements for grade R5 and higher
    - Measures to prevent hydrogen from CP
    - Reduce risk of HISC from ICCP – Rig & AHV

DNV-CP-0632 – (July 2025 Ed.)

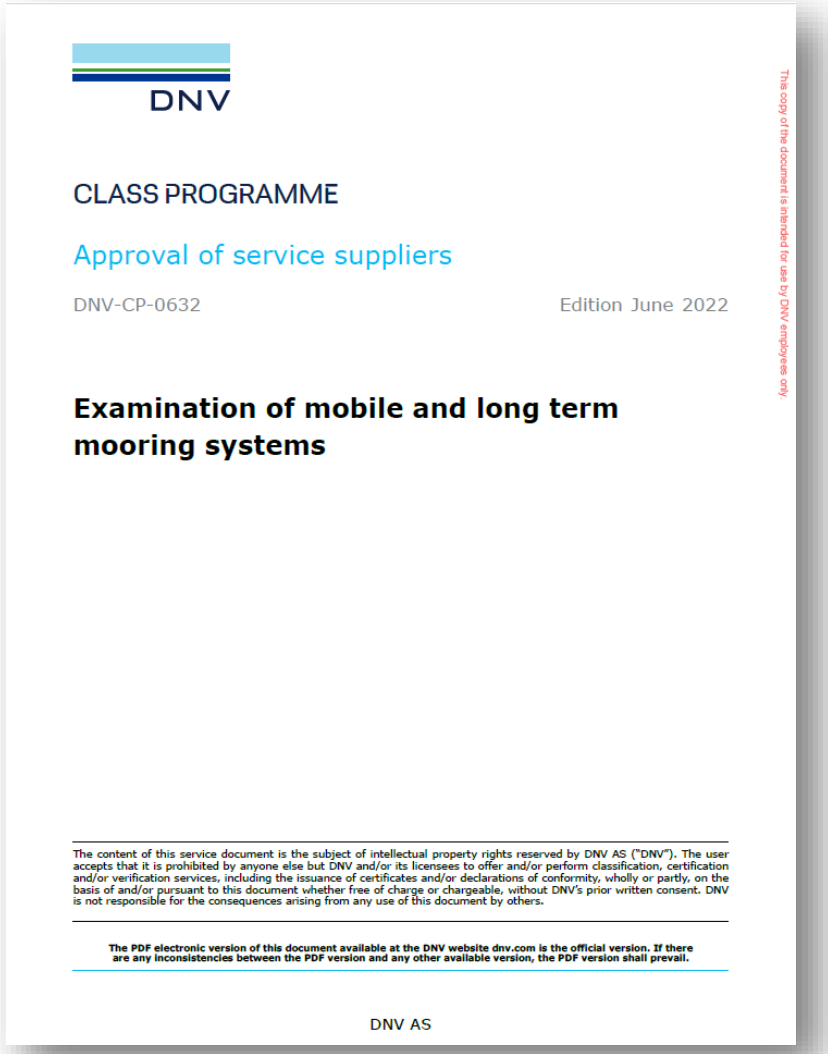
Updated Usage and logging-based survey scheme

- Risk-based inspection interval vs. accumulated service life & utilization/loading





Updates on DNV AOSS schemes



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CLASS PROGRAMME

Approval of service suppliers

DNV-CP-0632 Edition June 2022

Examination of mobile and long term mooring systems

This copy of the document is intended for use by DNV employees only.

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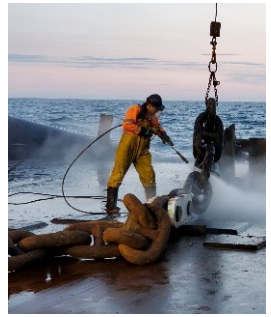
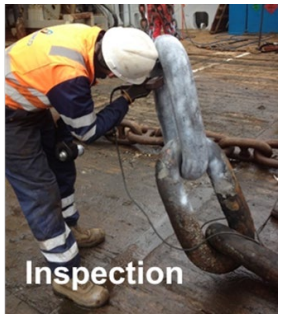
- Procedural requirements based on:
  - Type of operation
  - Logging of loads/utilization & accuracy
- Class approves process put in place by equipment owner based on the criteria in DNV-RU-OU-0300, App. D, Sec. 5. moved to DNV-CP-0632 (July 2025 Edition)
- Less direct DNV involvement
- Audit regime rather than survey regime
- Suitable for rental companies and asset owners with much equipment and who possesses the knowledge, organization and processes to handle the logistics required
- Scheme shall facilitate correct PoD level and optimize inspections to reduce risk of failures and ensure safer operations
- Require tension monitoring from operations - accuracy requirements to be introduced





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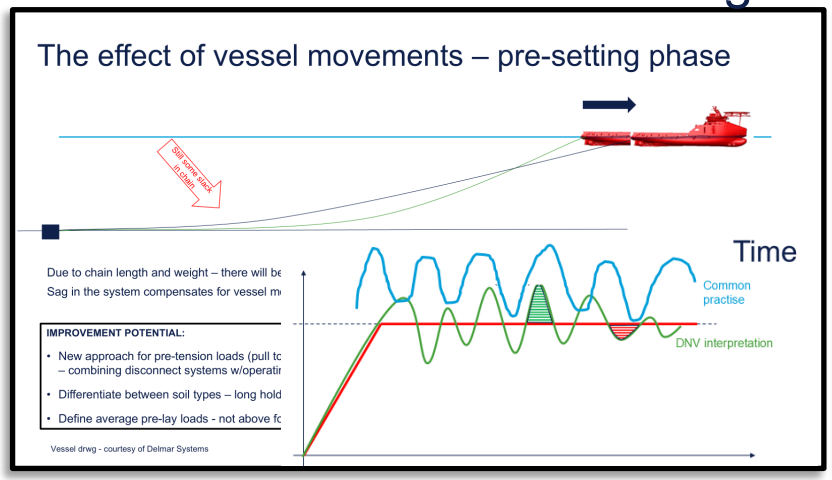
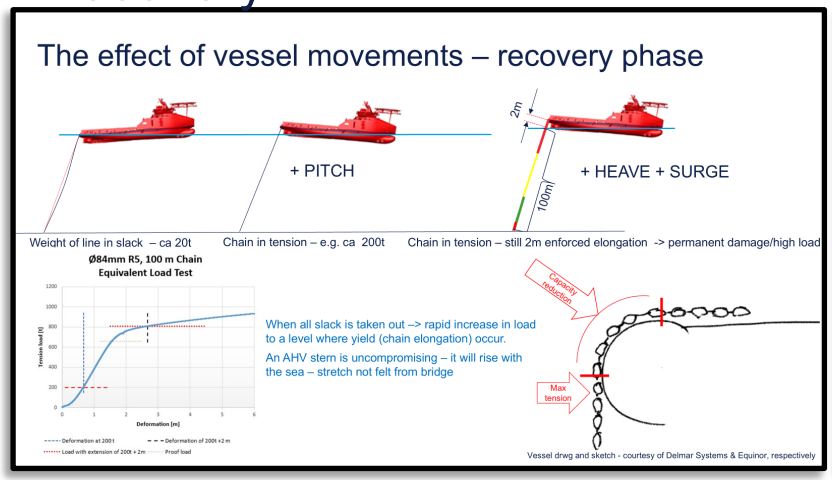
Phases of operation – focus areas – now and future...

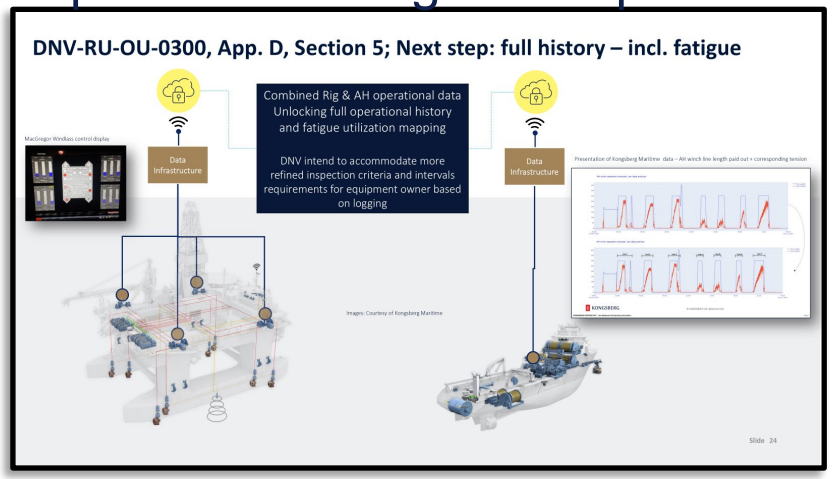
Installation / Anchor Tensioning



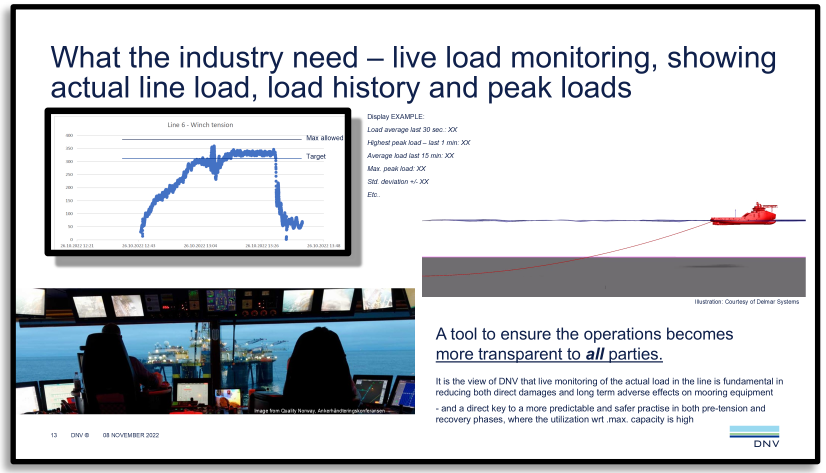
Recovery



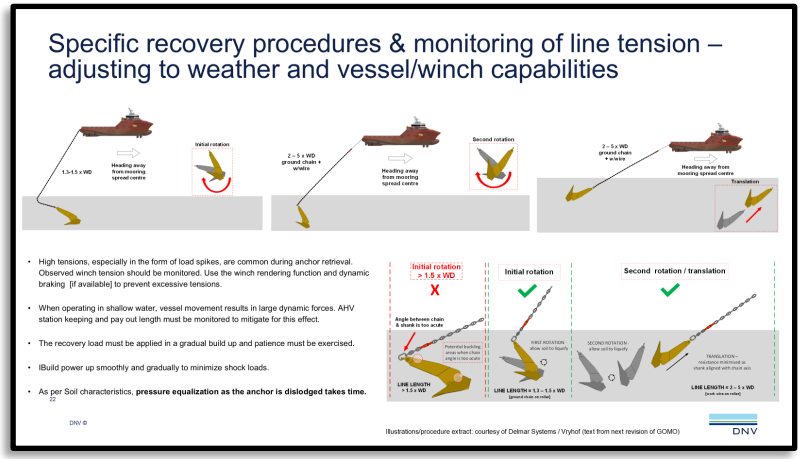
Operation -> fatigue - all phases



Load monitoring -> inspection



Recovery procedures



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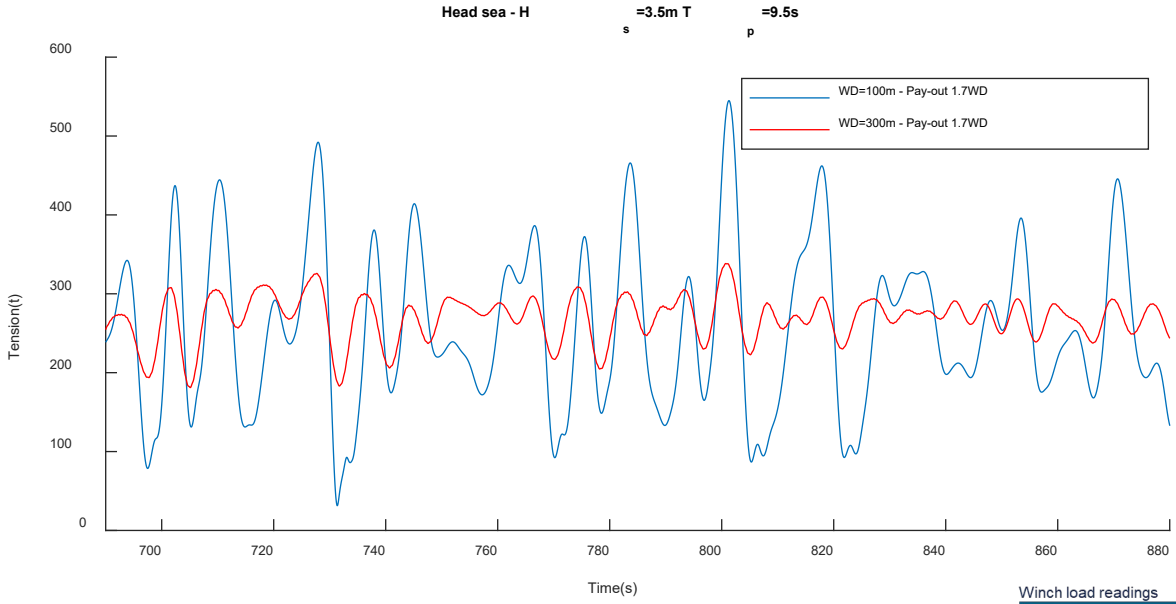
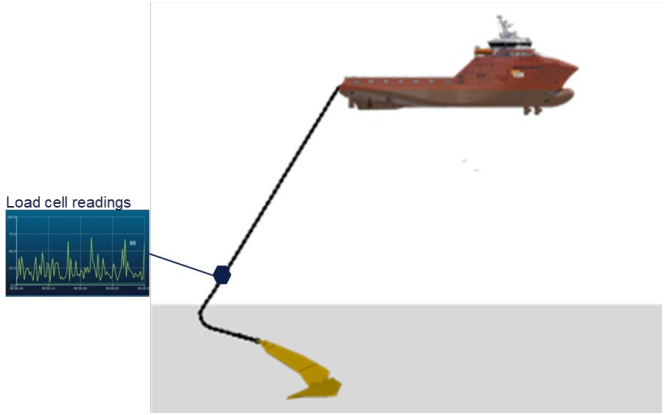
Recovery operations:

Actual line load vs. water-depth and pay-out vs. winch dynamic capability

(winch limitations often mitigated by applying winch brake - > high line loads)





<u>Identified options for improvement:</u>

- Increased and more available knowledge of vessel specific equipment capabilities and limitations -> improved winch data/curves, etc.
- Are winch operator getting timely information to adjust when approaching “borderline”..
- Anchor recovery procedures defined for given location, implemented and followed
- Use suitable components in the recovery segments (e.g. larger dia. chain & lower grades, etc)
- <u>Define weather window for anchor recovery - and wait until sufficiently calm weather or a vessel with a sufficient dynamic winch is available…allowing use of tension control.</u>
- Not all AHVs can/should recover anchors in shallow water at Hs 3,5.

Stern accelerations is the «killer» - when not compensated by AH winch (or calm weather)

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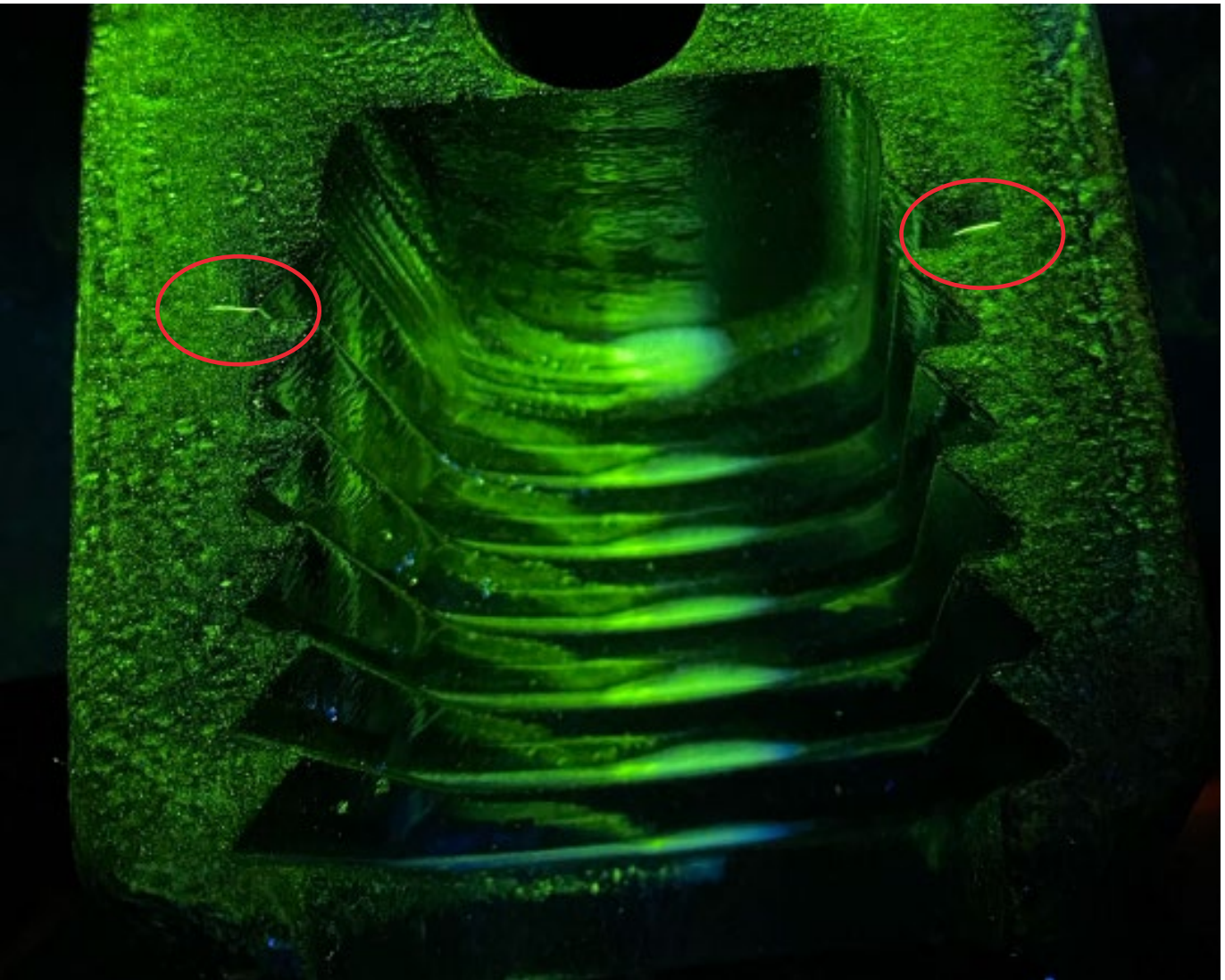
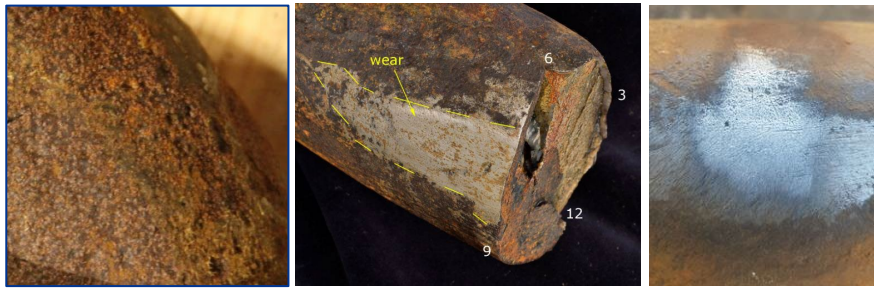
Probability of Detection (PoD)…

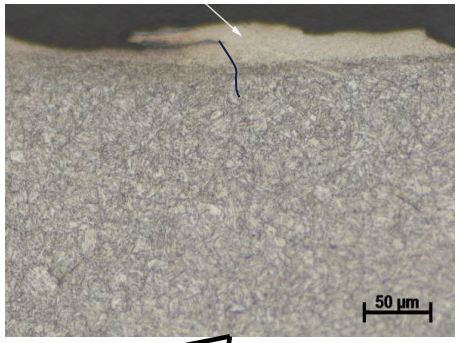


The Solution is not more inspection…but *Less Damage*

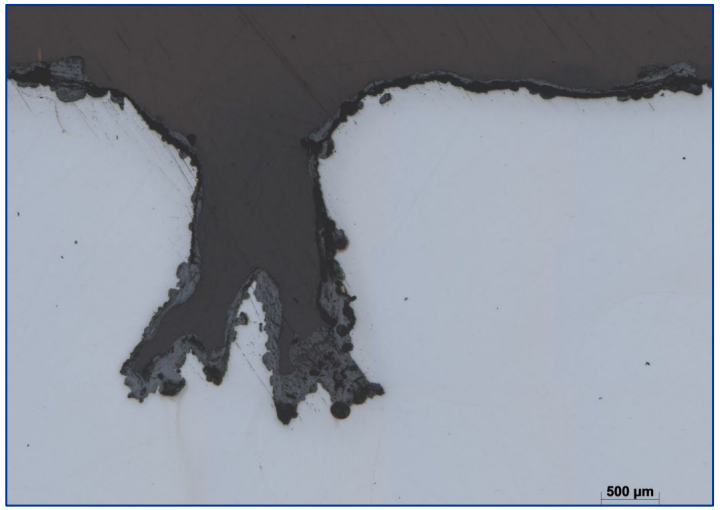
- Fatigue & Cracks – the mechanism



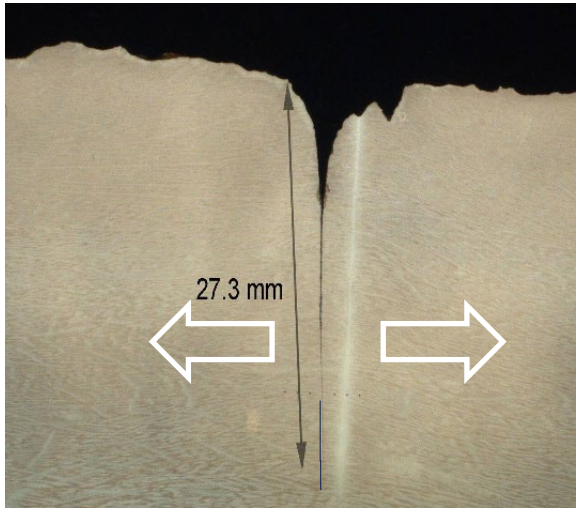
Various imperfections and other damage may act as crack starters



An initial crack is blunted by corrosion, as no more high loads are applied



An initial crack is subject to repeatedly high loading/utilization – crack grows and fatigue capacity is further reduced

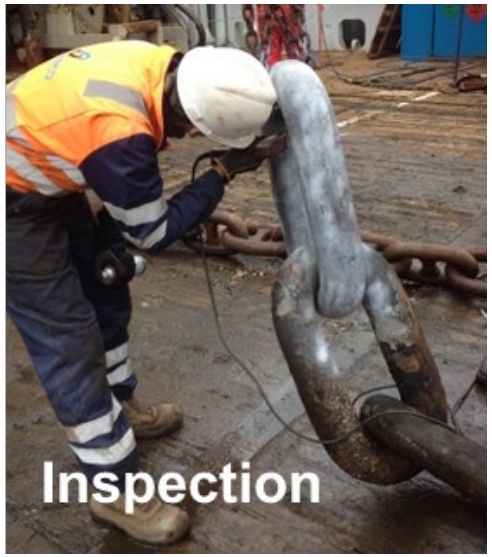


1. New inspection regime(s)

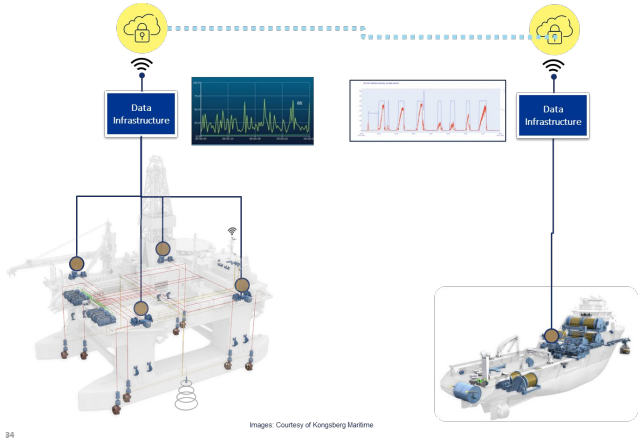
- Logging of loads + usage history
- targeted inspections

Summing up – why the focus on line tension logging

- Need to know the real line tension in recovery and shallow water operations
- Pre-tensioning <u>and particularly **recovery**</u> are the critical phases –
  - Logging at pre-setting – we do not want to set the anchors too hard…
  - Logging at recovery – highest loads/peak loads occur in this phase
    - Need tension data to identify and inspect the high-risk items
    - PoD at inspection increases if one can target the most loaded components



- With todays high utilization – fatigue is becoming an issue also for mobile mooring chain
  - Installation and recovery load history can be combined with rig data/tension (already logged by the rig winches)
  - This will be required - going forward



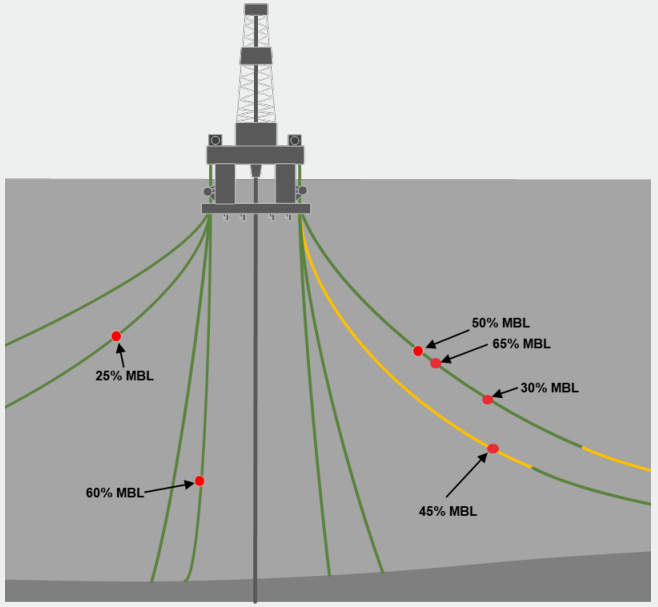
Why the focus on recovery loads and chain handling...

Equipment integrity

- Mooring chain defects are very hard to detect – inspection may not uncover all (low PoD)
- Doubt increases need for inspection
- Inspection increases cost
- Fatigue an issue with current practice

Rig mooring integrity

- The situation to be avoided: - multiple weakened undetected chain links/components present in the system



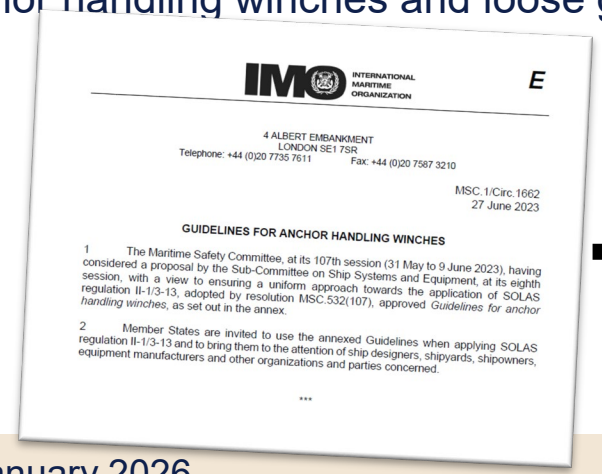
Deck crew safety

- Components failing under normal handling/low loads – unexpectedly
- Failures at “safe load” is a risk for personnel

Video: courtesy of Equinor

Anchor handling winches & loose gear

- New SOLAS regulation II-1/3-13:
  - Anchor handling winches to be designed, constructed, installed and tested based on IMO Guidelines.
  - Retroactive requirements to testing, thorough examination, operation, inspection and maintenance for all appliances (AH winch, shark jaws, etc) and loose gear.
- Guidelines for anchor handling winches and loose gear



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MSC.1/Circ.1662
27 June 2023

GUIDELINES FOR ANCHOR HANDLING WINCHES

1 The Maritime Safety Committee, at its 107th session (31 May to 9 June 2023), having considered a proposal by the Sub-Committee on Ship Systems and Equipment, at its eighth session, with a view to ensuring a uniform approach towards the application of SOLAS regulation II-1/3-13, adopted by resolution MSC.532(107), approved *Guidelines for anchor handling winches*, as set out in the annex.

2 Member States are invited to use the annexed Guidelines when applying SOLAS regulation II-1/3-13 and to bring them to the attention of ship designers, shipyards, shipowners, equipment manufacturers and other organizations and parties concerned.

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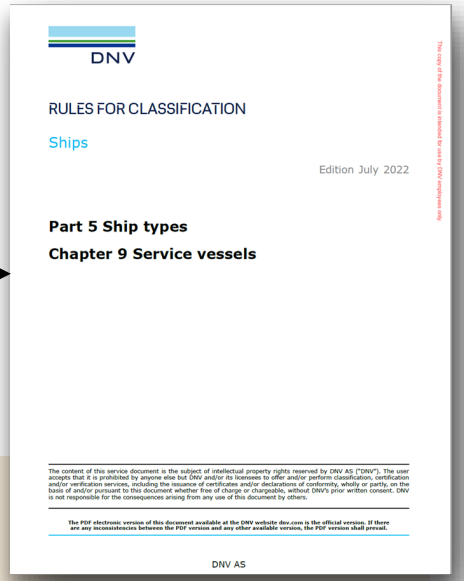

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RULES FOR CLASSIFICATION

Ships

Edition July 2022

Part 5 Ship types

Chapter 9 Service vessels

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DNV AS

Impact:

Entry into force on 1 January 2026.

The requirements will be applicable to new and existing ships.

The requirements to anchor handling winches will be applicable to vessels used for anchor handling operations.

References:

- Resolution MSC.530(107)
- MSC.1/Circ.1662 (anchor handling)

MSC.1/Circ. 1662

3.6.2 Operations manual

3.6.2.1 An operations manual for the anchor handling winches should be provided by the manufacturer. Where operations manuals for existing anchor handling winches are not available from the manufacturer, these may be provided by competent third parties.

3.6.2.2 The operations manual should, as a minimum, include the following for each anchor handling winch:

.1 design, operational and environmental limitations;

.2 compatible loose gear, if any;

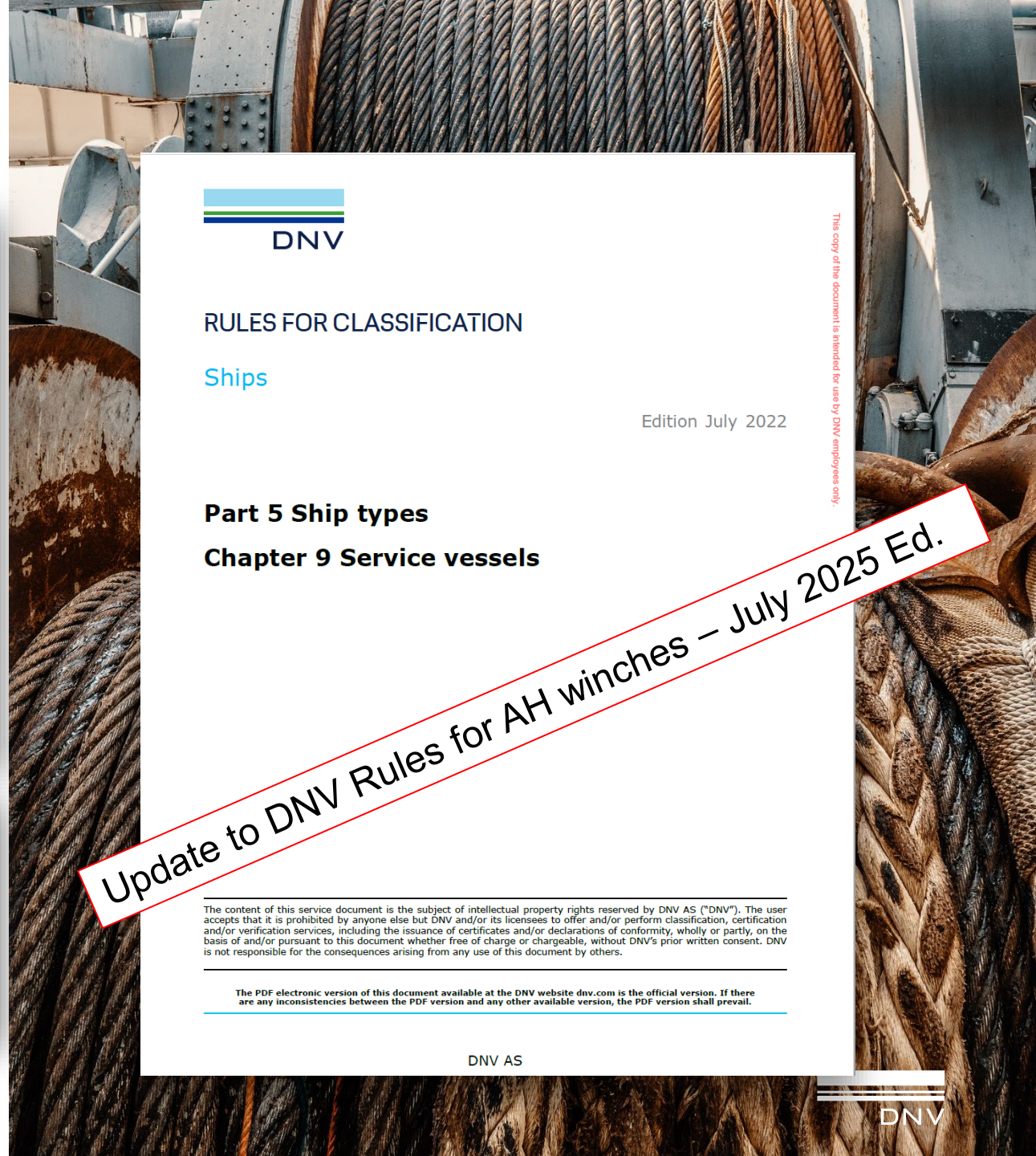
.3 safety instructions; and

.4 operating procedures, including emergency procedures, if any.

3.6.2.3 For anchor handling winches installed before 1 January 2026, their operations manual should be developed with original manufacture, design and build data, and take into account any modifications since installation. Where original data or modification data is not available, the operations manuals should be developed on the current operational procedures and practices.

3.3.2 Anchor handling winches installed before 1 January 2026 should be certified by the Administration or a classification society which is recognized by the Administration in accordance with the provisions of regulation XI-1/1 as compliant with SOLAS regulation II-1/3-13.2.5 no later than the date of the first renewal survey on or after 1 January 2026.

3.3.3 Existing anchor handling winches with valid certificates under another international instrument acceptable to the Administration and issued prior to the entry into force of SOLAS regulation II-1/3-13 should be considered compliant with SOLAS regulation II-1/3-13.2.5.



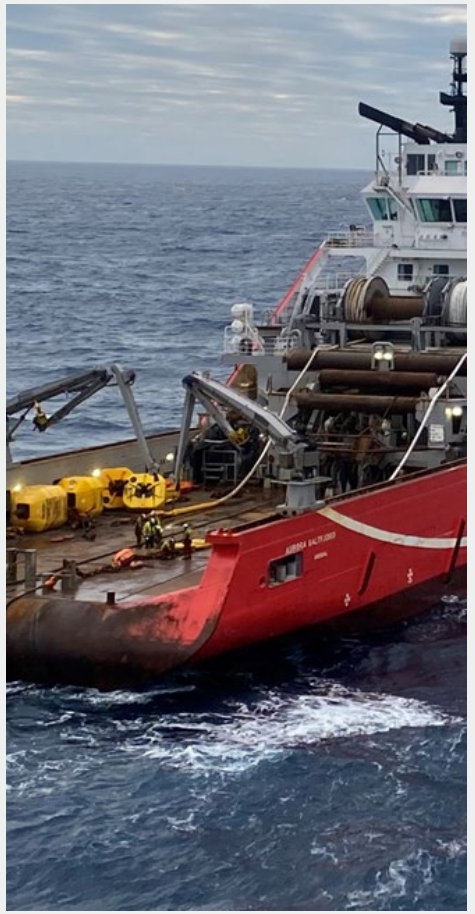
SOLAS regulation II-1/3-13 / MSC.1/Circ. 1662

Anchor handling winches

- ***3.1 Design, construction and installation***
- Speed control and handling
- Tension control
- Overload alarm and monitoring
- Control stations
- Spooling device
- Emergency release
- ***3.1.8 Associated anchor handling equipment***
- 3.1.8.1 Chain stopper

- ***3.2 Testing and thorough examination***
- *3.2.1 Commissioning test*
- *3.2.2 Periodical testing*
- *3.2.3 Thorough examination*
- *3.2.4 Records of testing and thorough examination*
- 3.3 Demonstration of compliance

- ***3.5 Maintenance, inspection and operational testing***
- *3.5.2 Maintenance manual*
- *3.5.3 Records of maintenance and inspection*



- ***3.6 Operations***
- 3.6.2 Operations manual
- Loose gear
- 4.1 Design and manufacturing
- 4.2 Proof test and thorough examination
- 4.2.1 Proof test
- 4.2.2 Thorough examination
- 4.3 Demonstration of compliance
- 4.5 Operation

- ***4.6 Maintenance and inspection***
- 4.7 Records of inspection, maintenance, testing and thorough examination
- 4.7.1 Records of thorough examination and testing
- 4.7.2 Records of inspection and maintenance

MSC.1/Circ. 1662

3.6 Operations

3.6.1 General

3.6.1.1 Personnel operating anchor handling winches and their associated equipment should be qualified, familiarized with the equipment and be authorized by the master.

3.6.1.2 All personnel involved in an anchor handling winch operation should understand their role during the operation and, in particular, the signals that may be required to commence, coordinate or stop the operation.

3.6.1.3 Personnel involved in anchor handling winch operations should be equipped with appropriate personal protective equipment for the task.

3.6.1.4 Anchor handling winch operations should be planned, supervised and carried out so that any identified risks are minimized.

3.6.1.5 Procedures and instructions should relate to the specific type of anchor handling winch and should be provided in the operations manual.

3.6.1.6 Due consideration should be given to any limiting operational conditions, such as the ship's motion/inclination, environmental conditions including sea state, maximum wind speeds including wind gusts, ice and snow accretion, as well as limitations of the anchor handling winch, such as maximum line pull, maximum brake holding capacity, etc.

3.6.1.7 Effective communication should be established among ship's personnel as well as other ships/offshore units involved in the anchor handling winch operation.

3.6.1.8 Safe means of access to anchor handling winches and the work area should be established. Safe areas for the personnel involved should be available.

3.6.1.9 When developing plans and procedures for anchor handling winch operations, consideration should be given to prevention of accidents or incidents due to the wires striking any person or other structures in close proximity.

3.6.1.10 Procedures and measures for the safe operation of anchor handling winches should take account of applicable international and national instruments and best practices for occupational safety and health.

3.6.1.11 Personnel operating the anchor handling winch should consult the operations manual for any specific instructions related to the anchor handling operations.

3.6.1.12 Periodic drills for emergency release and emergency brake operation should form part of the planned maintenance schedule.

WHEN TRUST MATTERS

Thank you

- Questions appreciated – now or later…

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Bergen 2025.04.23